VARIABLE CAPACITORS

for HF, VHF, UHF & Microwave Applications

CATALOG NO. C-06-A

MURATA ERIE NORTH AMERICA

Murata Erie offers a comprehensive line of high frequency trimmer capacitors which are miniature in size and combine the High Q and stability with excellent electrical characteristics. Dielectrics included in the line are ceramic, sapphire and air.

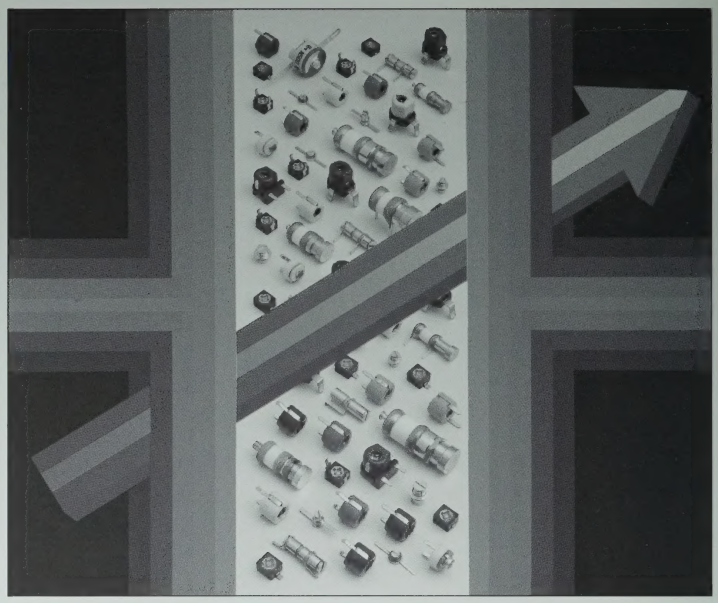
Murata Erie trimmer products feature low cost and high performance and cover the frequency spectrum from the low RF to the Gigahertz range and include half-turn through multi-turn high resolution devices.

FEATURES:

- **High Q's and excellent frequency characteristics**
- **Linear rotation-capacity characteristics**
- **Excellent and repetitive temperature characteristics**
- **Outstanding shock and vibration characteristics**

SPECIALS:

It is Murata Erie's policy to automate production procedures, wherever possible, for the purpose of cost and price reduction as well as quality improvement and repeatability. We recognize that many trimmer applications require non-standard assemblies, mounting considerations, or test and packaging needs. For that reason, our trimmer tooling and general procedures have been developed with a unique capability—adaptability. Inquiry is invited regarding any non-standard assembly for either military or commercial application. Contact your local Murata Erie sales office or the Murata Erie application engineering staff for help on specific design problems.



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GLOSSARY OF SPECIALIZED TERMS

1. DIELECTRIC:
Sometimes called "Insulator", a dielectric is a material whose internal charges are bound and can therefore only move over atomic dimensions. It separates the conductive capacitor plates and is important in determining temperature characteristics, voltage rating, capacity/volume and other characteristics of a capacitor.

2. DISSIPATION FACTOR (DF):
The dissipation factor of an insulating material is defined as the ratio of energy dissipated to energy stored in the dielectric. The DF is frequency sensitive and must be specified at a given frequency.

3. QUALITY FACTOR ("Q"):
The Q factor is the ratio of energy stored to energy dissipated and is therefore often taken as the inverse of the DF at low frequency. Sometimes called "Figure of Merit," Q factors must be specified at a given frequency.

4. WORKING (OR RATED) VOLTAGE:
Nominal continuous voltage which may be applied to a component with no derating of any kind.

5. DIELECTRIC WITHSTANDING ("BREAKDOWN") VOLTAGE:
The peak voltage which the component is designed to withstand without damage for short periods of time. This value must be specified in terms of frequency, waveform, and time.

6. INSULATION RESISTANCE (MEGOHMS):
I.R. is the terminal to terminal DC resistance of a capacitor, and must be specified in terms of voltage, temperature, and relative humidity.

7. TEMPERATURE COEFFICIENT ("TC"):
"TC" is the decimal change in capacity per degree change in environmental temperature. Some dielectrics are very lossy and generate internal heat and for that reason this test is conventionally conducted under "no load" conditions. The standard definition for "TC" in parts per million per degree centigrade is...

$$TC = \frac{(Cx - Co)}{Co} X \frac{(10^6)}{(Tx - To)} \ /°C$$

Where "Tx" is the test temperature, "To" is the reference temperature - usually 25°C. "Co" is the capacity measured at the reference temperature and "Cx" is the capacity measured at the test temperature.

8. DRIFT:
The extent in pF or % to which capacitor changes value as a result of temperature exposure. Sometimes called "Retrace", this measurement is usually made under nominal (i.e. room) conditions and is accomplished both before and after the conclusion of temperature excursion. (Note: "Drift" may occasionally be used in the test context of the simple passage of time).

9. TERMINATION:
This term refers to the material and/or geometry of the terminals of the capacitor.

10. RF POWER:
Typically measured in KVA (apparent power) for signals with frequencies greater than 1 MHz. RF Power is limited by the maximum rated voltage or the maximum power the capacitor is able to dissipate.

11. TRIMMER CAPACITOR:
This variable type of capacitor is designed to permit precision adjustment of capacitance value. These trimming capacitors are intended for factory or maintenance adjustments only.

12. RANGE:
Trimmer capacitor range is specified in terms of "Min." and "Max." This specification indicates the guaranteed capacitance values between which the device is intended to be adjustable.

13. TUNING TORQUE:
Specified in terms of inch-ounces or gram-centimeters. Torque is intentionally introduced to trimmer capacitor design to prevent unintended tuning due to shock, vibration or other environmental factors. This requirement is specified in terms of "Min." and "Max."

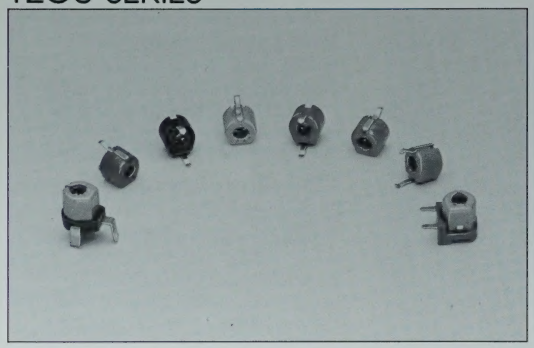
14. RESOLUTION:
Specified in terms of "pF per turn". This specification indicates the accuracy with which the trimmer can be set to a particular value.

15. LINEARITY:
This term defines the specification for change in capacity per turns or degrees of rotation.

16. REVERSALS:
This term refers to a change of "sign" of the capacity vs. turns characteristic slope.

17. SEAL:
This term refers to the extent to which the interior of the capacitor is closed off to the outside influences of moisture, solvents or other contaminants.

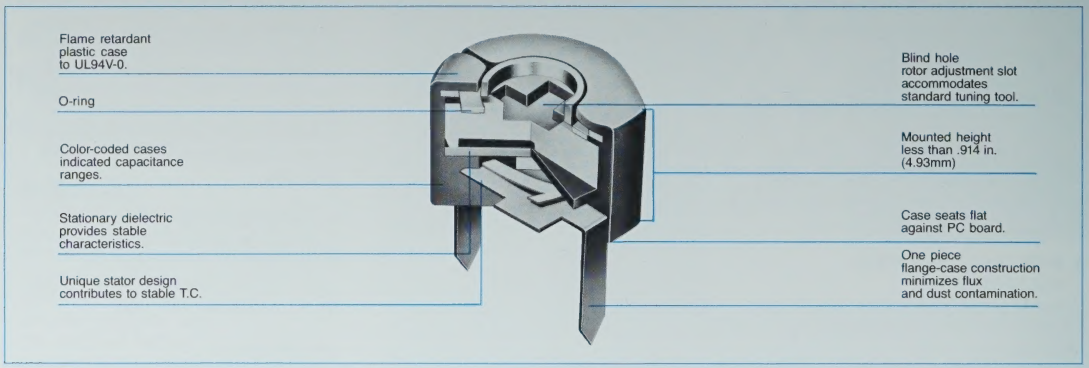
TRIMCAP®
AXLE-LESS CERAMIC TRIMMER CAPACITORS
TZ03 SERIES



The TZ Series ceramic trimmer capacitors are built into and protected by a color coded plastic case. This unique, axle-less and solder-less construction protects the unit from damages during assembly and provides exceptionally linear temperature coefficient at low cost.

FEATURES

- **Washable with utilizing a unique O-ring seal**
- **QPL approval to MIL-C-81* as CV42**
- **Excellent shock and vibration resistance**
- **Exceptionally linear TC**
- **Dust and flux resistant construction**
- **Plastic case meets UL94V-0**
- **Very adaptable to auto insertion**


Flame retardant plastic case to UL94V-0.
O-ring
Color-coded cases indicated capacitance ranges.
Stationary dielectric provides stable characteristics.
Unique stator design contributes to stable T.C.
Blind hole rotor adjustment slot accommodates standard tuning tool.
Mounted height less than .914 in. (4.93mm)
Case seats flat against PC board.
One piece flange-case construction minimizes flux and dust contamination.

SPECIFICATIONS

Working Voltage: 100VDC or 50 VDC
Withstanding Voltage: 220 VDC (100V units) or 110VDC (50 V units)
Insulation Resistance: 10^4MΩ min. (50 VDC, C max.)
Operating Torque: .3 to 2 in.-oz.

Part Number	Capacitance (pF) Min.	Capacitance (pF) Max.	Temp. Coeff. (ppm/°C)	Q (1MHz, °C max.)	Temperature (°C)	Case Color
SINGLE CERAMIC PLATE TYPE, 100V SERIES						
TZ03Z2R3□□169	1.25	2.3 $^{+0}_{+50}$%	NPO ± 200	300 min.	−55 to +85	Black
TZ03Z050□□169	1.8	5.0 $^{+0}_{+50}$%	NPO ± 200	300 min.	−55 to +85	Blue
*TZ03Z070□□169	2.0	7.0 $^{+0}_{+50}$%	NPO ± 200	300 min.	−55 to +85	Blue
TZ03Z100□□169	2.7	10.0 $^{+0}_{+50}$%	NPO ± 200	500 min.	−55 to +85	Blue
TZ03N100□□169	2.1	10.0 $^{+0}_{+50}$%	N220 ± 200	500 min.	−55 to +85	White
*TZ03T110□□169	3.0	11.0 $^{+0}_{+50}$%	N450 ± 300	500 min.	−55 to +85	White
*TZ03T200□□169	4.2	20.0 $^{+0}_{+50}$%	N450 ± 300	500 min.	−55 to +85	Pink
*TZ03R200□□169	4.2	20.0 $^{+0}_{+50}$%	N750 ± 300	500 min.	−55 to +85	Red
*TZ03R300□□169	5.2	30.0 $^{+0}_{+50}$%	N750 ± 300	500 min.	−55 to +85	Green
TZ03P450□□169	6.8	45.0 $^{+0}_{+50}$%	N1200 ± 500	300 min.	−55 to +85	Yellow
TZ03P600□□169	9.8	60.0 $^{+0}_{+50}$%	N1200 ± 500	300 min.	−55 to +85	Brown
TZ03P700□□169	12.0	70.0 $^{+0}_{+50}$%	N1200 ± 500	300 min.	−55 to +85	Brown
MONOLITHIC CERAMIC PLATE TYPE, 50V SERIES						
TZ03Z500□□169	6	50 $^{+0}_{+100}$%	NPO ± 300	300 min.	−55 to +85	Orange
TZ03R900□□169	9	90 $^{+0}_{+100}$%	N750 ± 300	300 min.	−55 to +85	Black
TZ03R121□□169	10	120 $^{+0}_{+100}$%	N750 ± 300	300 min.	−55 to +85	Black

□: Terminal Shape Stray capacitance for side adjustment (Y type) adaptor is .2pF, for three terminal (TH type) adaptor is .4pF.
*QPL approval to MIL-C-81

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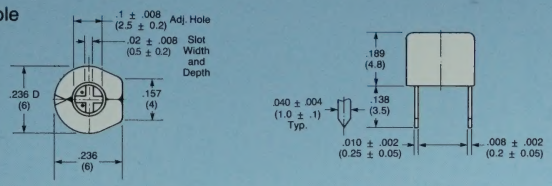
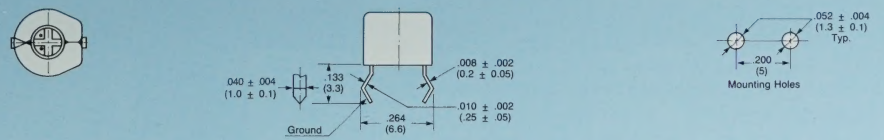
TZ03 SERIES

DIMENSIONS: in. (mm)

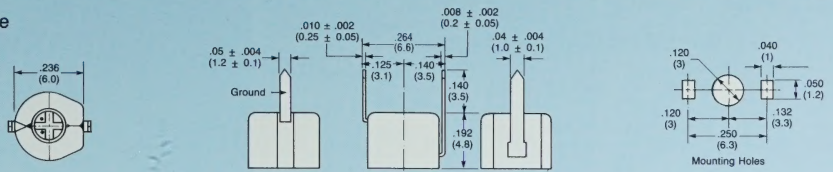
ER TYPE
Top Adjustable



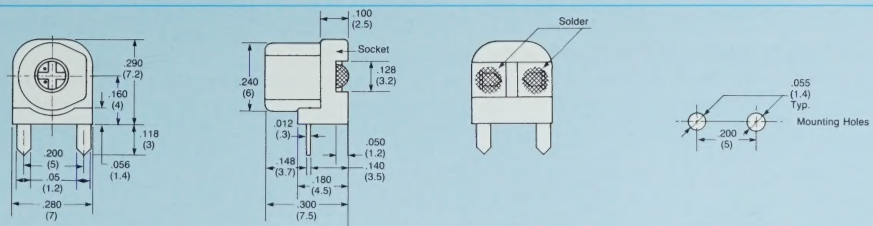
FR TYPE
Self-Standing



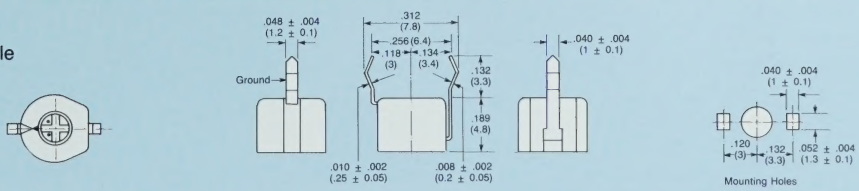
BR TYPE
Bottom Adjustable



YR TYPE
Side Adjustable



NR TYPE
Self-Standing
Bottom Adjustable



Notes:
Common dimensions shown on ER Style
Tolerances (unless otherwise shown) ±0.02" and ±0.5mm

ORDERING INFORMATION

TZ 03	Z	070	ER	169
Type	Temperature Characteristic	Capacitance (pF)	Terminal Configuration	Sealed Unit

HANDLING CAUTIONS

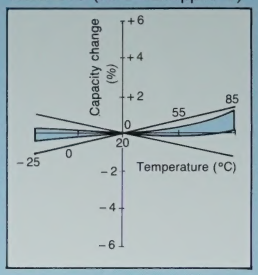
- When soldering, make sure that soldering iron does not touch the plastic case.
- Do not use locking adhesives.
- Do not apply excessive force to the terminals.

TRIMCAP®
AXLE-LESS CERAMIC TRIMMER CAPACITORS
TZ03 SERIES

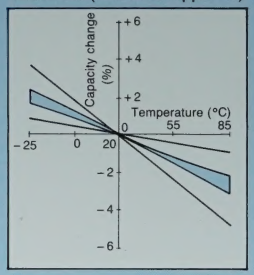
TECHNICAL DATA

Temperature Characteristics

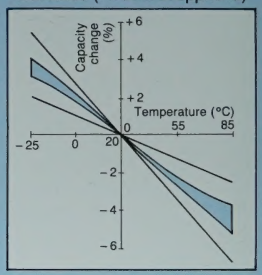
TZ03Z070 (NPO ± 200ppm/°C)



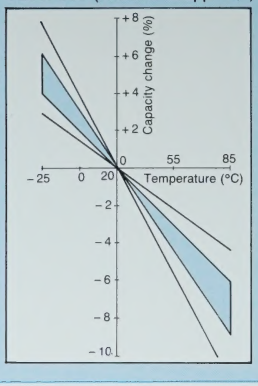
TZ03T110 (N450 ± 300ppm/°C)



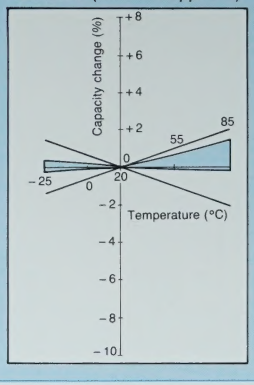
TZ03R200 (N750 ± 300ppm/°C)



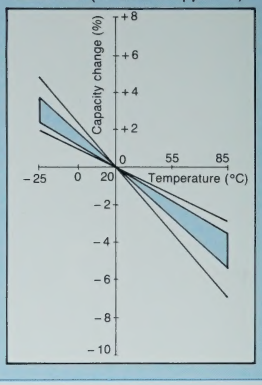
TZ03P600 (N1200 ± 500ppm/°C)



TZ03Z500 (NPO ± 300ppm/°C)



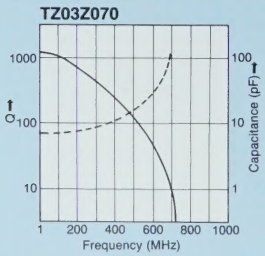
TZ03R121 (N750 ± 300ppm/°C)



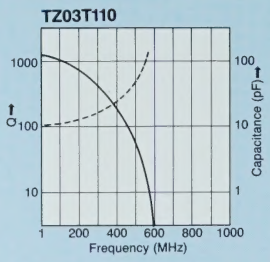
Q AND CAPACITANCE VS FREQUENCY CHARACTERISTICS

Characteristics on curves are measured at the position of maximum rated capacitance value using RF impedance analyzer.

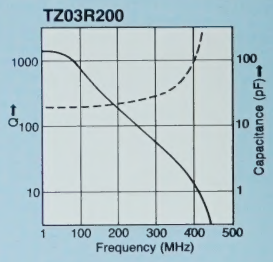
TZ03Z070



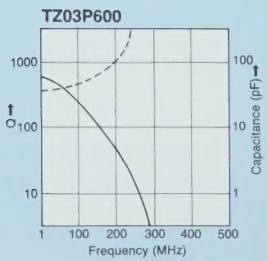
TZ03T110



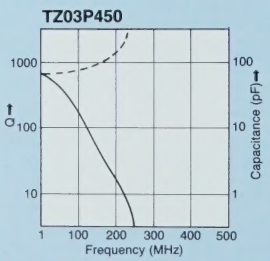
TZ03R200



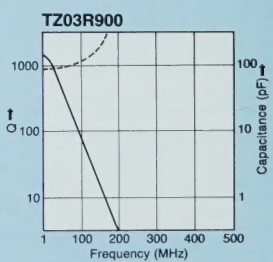
TZ03P600



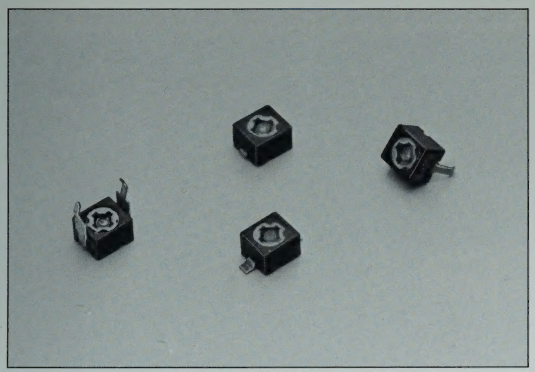
TZ03P450



TZ03R900



CHIP TRIMMER CAPACITORS TZB04 SERIES

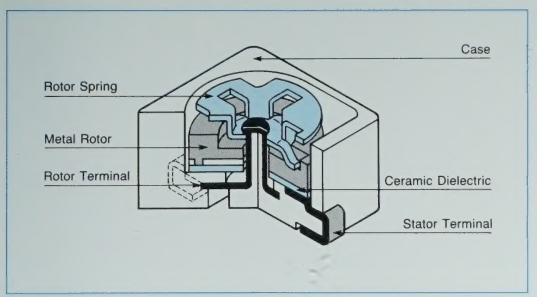


Murata Erie's new chip trimmer capacitors are specifically designed for automatic surface placement. The small size and outstanding performance over a wide frequency spectrum make them entirely compatible with other types of surface mounted components.

FEATURES

- **QPL approval to MIL-C-81* as CV50 and CV51**
- **Miniature rectangular shape just 0.16 (4.0) x 0.18 (4.5) x 0.12 (3.0) in. (mm)**
- **Specifically designed for auto surface placement. Designed to withstand solder bath (260°C, 5 sec.) and flux baths**
- **Impervious to solvent cleaners**
- **Can be reflow soldered**
- **Available (optionally) as totally sealed package**
- **Conventional snap-in configuration available**

CONSTRUCTION



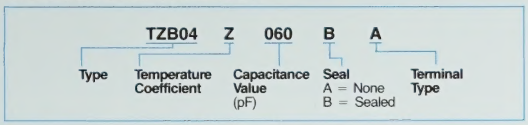
APPLICATIONS

- Transceiver
- VTR System
- Audio Equipment
- Radio
- Clock
- Pagers

PACKAGING FORMS

- Tape and Reel
- Bulk
- Magazine

ORDERING INFORMATION



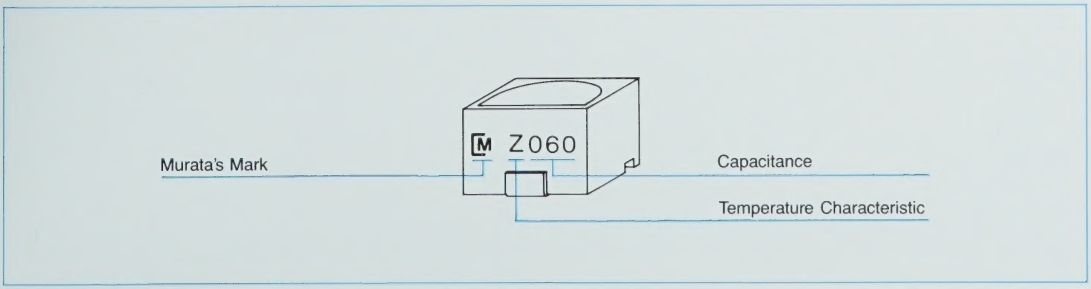
SPECIFICATIONS

Part Number	Capacitance Min.	Capacitance Max.	Temperature Coefficient	Q (Min.) (1MHz, Cmax)	Working Temperature Range
TZB04Z030□□	1.4 pF	3.0 pF (+ 50% − 0%)	NPO ± 200 ppm/°C	300	−55°C to +85°C
***TZB04Z060□□**	2.0 pF	6.0 pF (+ 50% − 0%)	NPO ± 200 ppm/°C	500	−55°C to +85°C
TZB04N100□□	3.0 pF	10.0 pF (+ 50% − 0%)	N150 ± 300 ppm/°C	500	−55°C to +85°C
TZB04R200□□	4.5 pF	20.0 pF (+ 50% − 0%)	N750 ± 300 ppm/°C	500	−55°C to +85°C
***TZB04P300□□**	6.5 pF	30.0 pF (+ 50% − 0%)	N1200 ± 500 ppm/°C	300	−55°C to +85°C
TZB04P400□□	9.0 pF	40.0 pF (+ 50% − 0%)	N1200 ± 500 ppm/°C	300	−55°C to +85°C
TZB04Z250□□	4.0 pF	25.0 pF (+100% − 0%)	NPO ± 300 ppm/°C	300	−55°C to +85°C
TZB04R500□□	7.0 pF	50.0 pF (+ 50% − 0%)	N750 ± 300 ppm/°C	300	−55°C to +85°C

• **Rated voltage**...100VDC • **Withstand voltage**...220 VDC • **Insulation resistance**...10^4MΩmin. • **Torque**...15 to 200g-cm
50VDC for Z250, R500

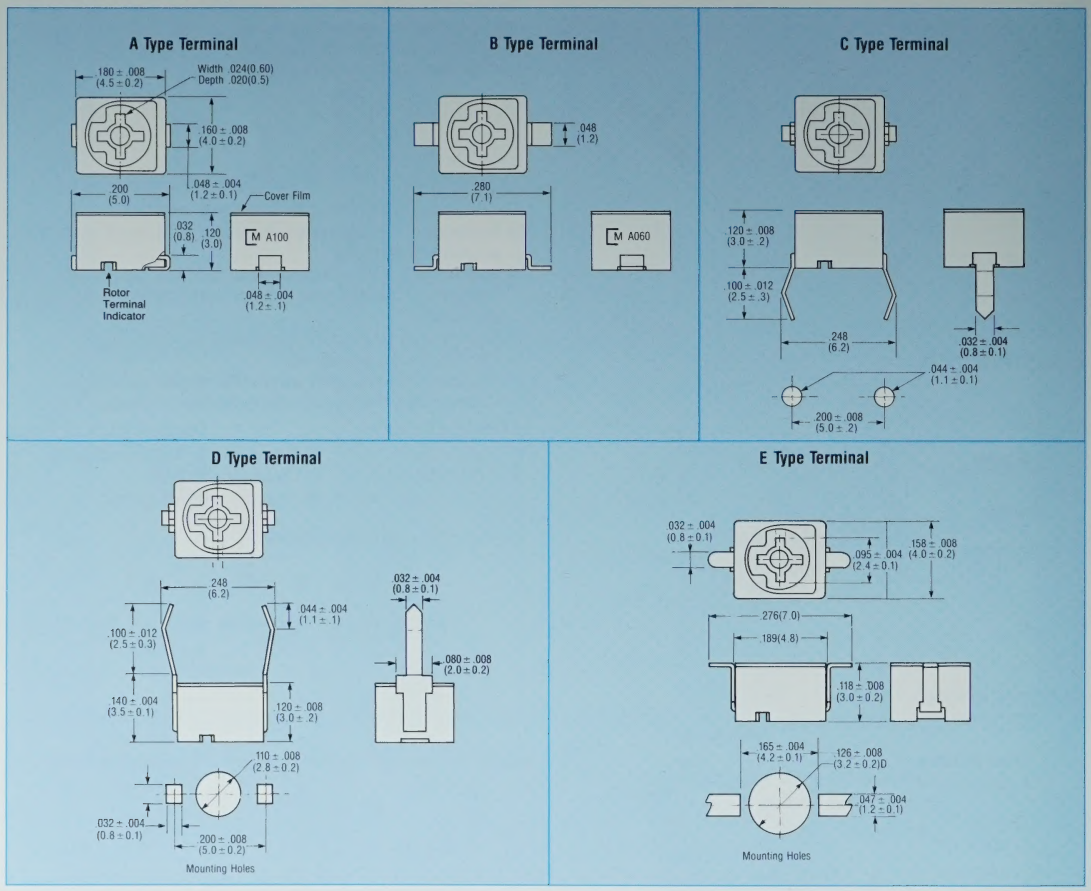
*QPL approval to MIL-C-81

MARKING

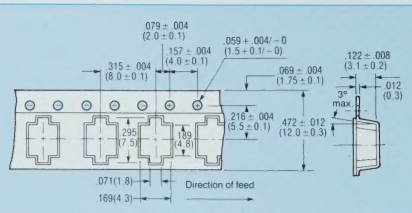


CHIP TRIMMER CAPACITORS TZB04 SERIES

DIMENSIONS: in. (mm)



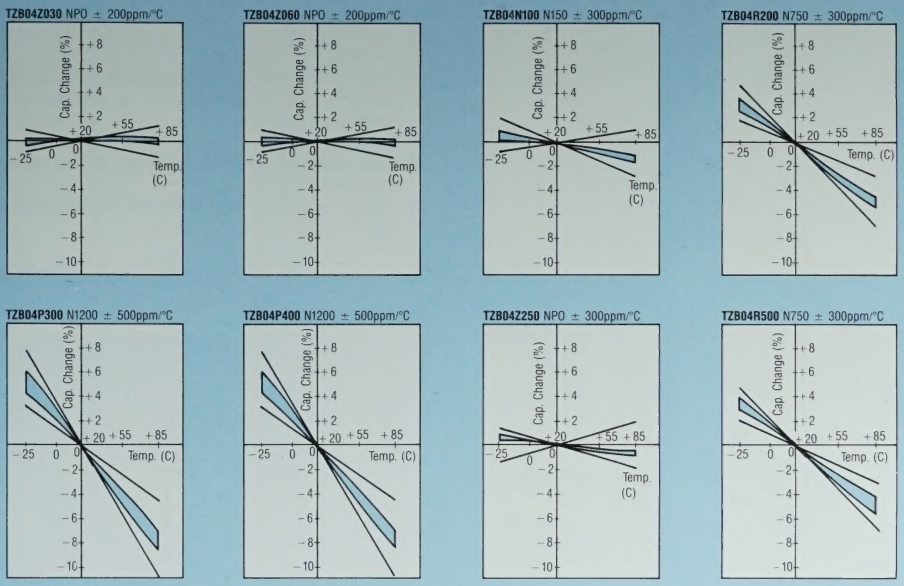
DIMENSIONS OF PLASTIC TAPING AND MAGAZINE



Part numbers of the taping type are TZB04□□□□□A006, TZB04□□□□□B006 or TZB04□□□□□E006, (500pcs/reel)
TZB04□□□□□A014, TZB04□□□□□B014 or TZB04□□□□□E014, (2500pcs/reel)

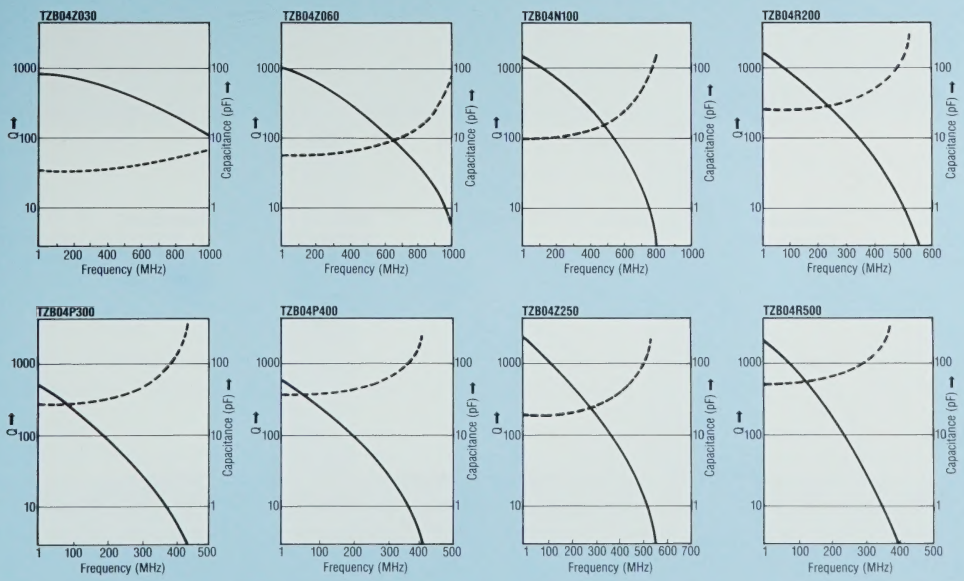
Part numbers of the magazine type are TZB04□□□□□A023, TZB04□□□□□B023 or TZB04□□□□□C0 23.

TEMPERATURE COEFFICIENT CHARACTERISTICS



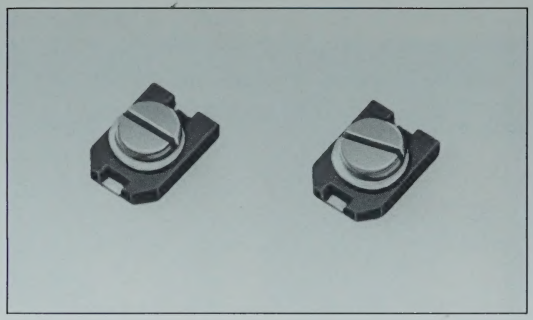
Q AND CAPACITANCE VS FREQUENCY CHARACTERISTICS

Characteristics are measured at the position of maximum rated capacitance value using an RF impedance analyzer.



Note: The solid line shows Q and the dotted line shows capacitance variation.

CHIP TRIMMER CAPACITORS
TZC03 SERIES

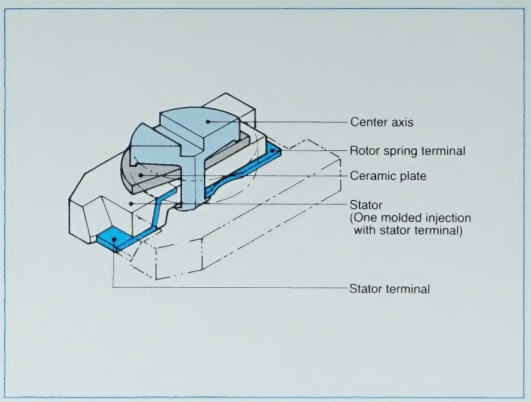


This new low profile chip trimming capacitor is specifically designed to meet the requirements of high density surface mount applications and automated placement equipment.

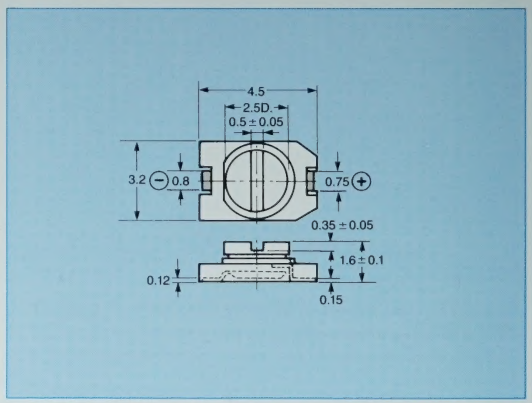
FEATURES

- **Extremely small size—just 3.2 mm x 4.5 mm x 1.6 mm**
- **Designed for auto-placement in surface mount applications**
- **Color-coded**
- **Heat-resistant resin withstands reflow soldering temperatures**
- **Can be adjusted with standard adjustment tools**

CONSTRUCTION



DIMENSIONS: mm



PART NUMBERING SYSTEM

TZC03 Z 060 A 110 T00

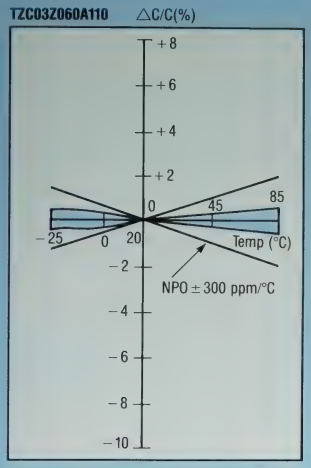
Chip Ceramic Trimmer Capacitor	Temperature Characteristic	Capacitance	Terminal Type	Other Specifications	Packaging Unit
				110: Standard	T00: 180D.mm Taping (1000pcs/reel) T01: 330D.mm Taping (4000pcs/reel) No code: Bulk (500 pcs/bulk)

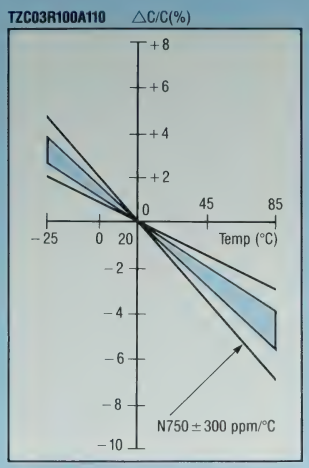
RATINGS

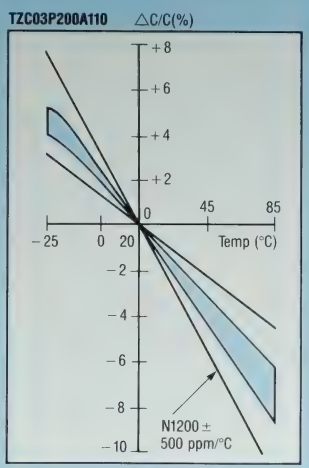
Part Number	Capacitance Min. (max.)	Capacitance Max ($^{+80}_{-20}$%)	Temperature Coefficient (ppm/°C)	Q (1MHz, Cmax)	Working Temperature Range (°C)	Stator Color
TZC03Z060□□	2.0	6.0	NPO ± 300	500min.	−25 to +85	Blue
TZC03R100□□	3.0	10.0	N750 ± 300	500min.	−25 to +85	White
TZC03P200□□	5.0	20.0	N1200 ± 500	300min.	−25 to +85	Red

• **Rated voltage**...100VDC • **Withstand voltage**...220 VDC • **Insulation resistance**...10^4MΩmin. • **Torque**...15 to 200g•cm

TEMPERATURE COEFFICIENT CHARACTERISTICS

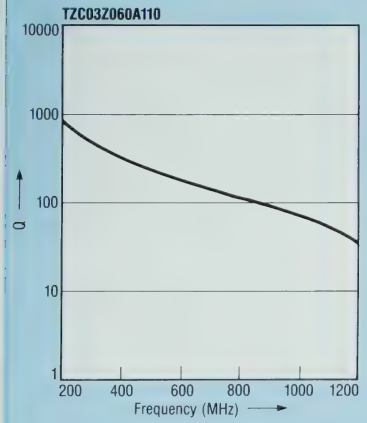


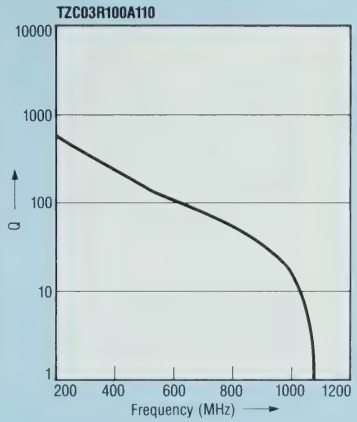


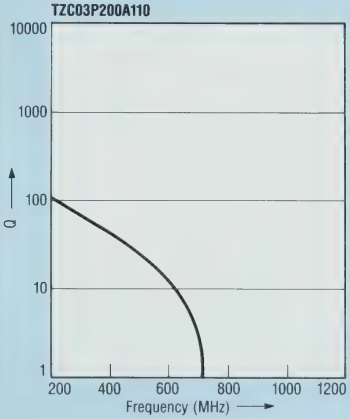


Q VS FREQUENCY CHARACTERISTICS

Characteristics are measured at the position of maximum rated capacitance value using an RF impedance analyzer.

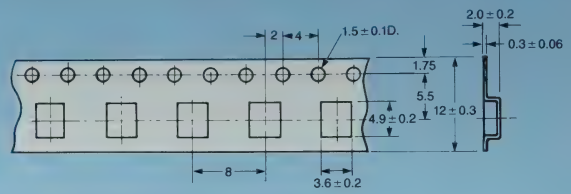






CHIP TRIMMER CAPACITORS
TZC03 SERIES

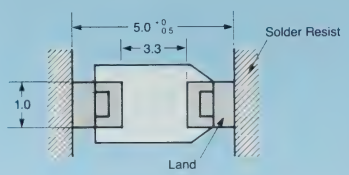
DIMENSIONS: mm FOR PLASTIC TAPE CARRIER



Conforming to EIAJ standard RC-1009B
Packaging unit: 1000pcs/reel (180mm D.)
4000pcs/reel (330mm D.)

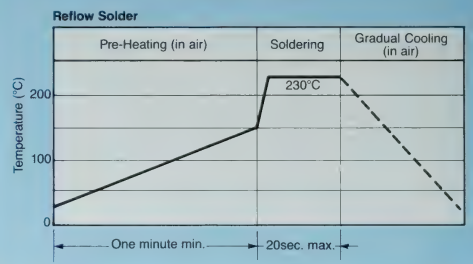
MOUNTING INFORMATION

Standard Land Dimensions



STANDARD SOLDERING CONDITIONS

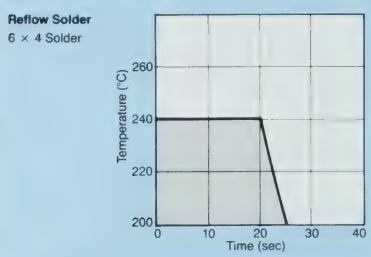
Reflow Solder



SOLDERING CONDITIONS

Soldering temperature and time

Solder within the range indicated by the graph below. If soldering is repeated, not that the allowed time is accumulated.



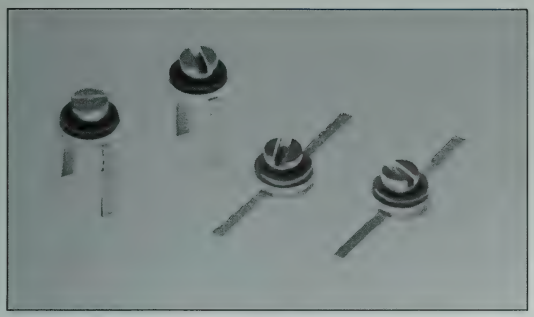
Soldering with Iron

Use a soldering iron of less than 30W. Complete soldering within 4 seconds at soldering tip temperature of 270°C.

CAUTIONS IN HANDLING

1. Do not allow excessive force to be applied to the trimmer capacitor when mounting it on the P.C.B.
2. Polarity is noted in dimensional diagram (+ ... Hot, − ... Ground)
3. Do not clean with solvents.
4. Minimal downward pressure should be applied when tuning.
5. Non-metallic screwdriver tips may be necessary in some applications. These screwdrivers are available from Murata Erie (Part Number ME502).
6. Locking adhesives are not recommended.

TRIMMING CAPACITORS
DVS3 SERIES

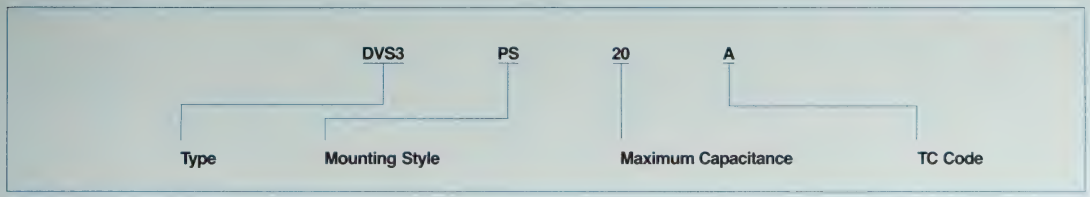


DVS 3 subminiature ceramic trimmer capacitors described below combine the best features of a variety of ceramic trimmers. They are designed for minimum space applications at frequencies up to UHF and offer micro-module and hybrid designers a choice of wide "delta C's" in an extremely small and stable unit at no additional cost. The unique design assures high reliability combined with low losses and exceptional stability over a wide temperature and frequency range.

FEATURES

- **Subminiature size: .126 (3.2 mm) dia.**
- **Wide capacitance range: 5.0 to 20 pF in NPO, 5.0 to 35 pF in N750**
- **Adjustable with standard screwdriver**

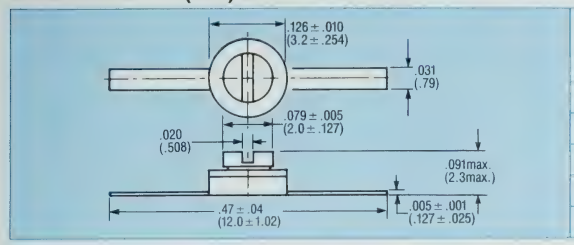
ORDERING INFORMATION



SPECIFICATIONS

Operating Temperature Range:	−55°C to +85°C
Working Voltage:	25VDC
Test Voltage:	50VDC
"Q" Factor:	500 min. @ 1 MHz
Insulation Resistance:	10^4 Megohms min.
Tuning Torque:	.2 to 1.5 in.-oz.

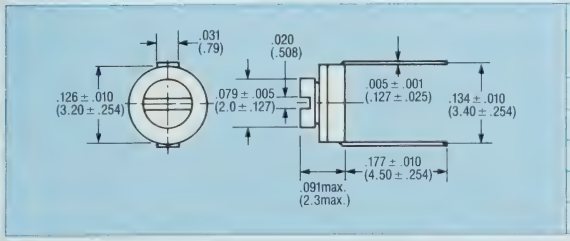
DIMENSIONS: in. (mm) DVS3A SERIES



DVS3A

Part Number	Capacitance Range (pF)	Temp. Coeff. (ppm/°C)	Color Code
DVS3A6A	1.5 to 6.0	NPO ± 300	Red
DVS3A10A	2.0 to 10.0	NPO ± 300	Black
DVS3A15A	3.0 to 15.0	NPO ± 300	Yellow
DVS3A20A	5.0 to 20.0	NPO ± 300	Violet
DVS3A35D	5.0 to 35.0	N750 ± 350	—

DIMENSIONS: in. (mm) DVS3PS SERIES



DVS3PS

Part Number	Capacitance Range (pF)	Temp. Coeff. (ppm/°C)	Color Code
DVS3PS6A	1.5 to 6.0	NPO ± 300	Red
DVS3PS10A	2.0 to 10.0	NPO ± 300	Black
DVS3PS15A	3.0 to 15.0	NPO ± 300	Yellow
DVS3PS20A	5.0 to 20.0	NPO ± 300	Violet
DVS3PS35D	5.0 to 35.0	N750 ± 350	—

TRIMMING CAPACITORS
DV11 SERIES

The DV11 Series of ceramic trimmer capacitors is the basic "standard" of the industry. It is extremely rugged and provides exceptional performance into the UHF frequency range. It is particularly applicable where space is not an important problem and where tuning ease is of utmost importance.

FEATURES

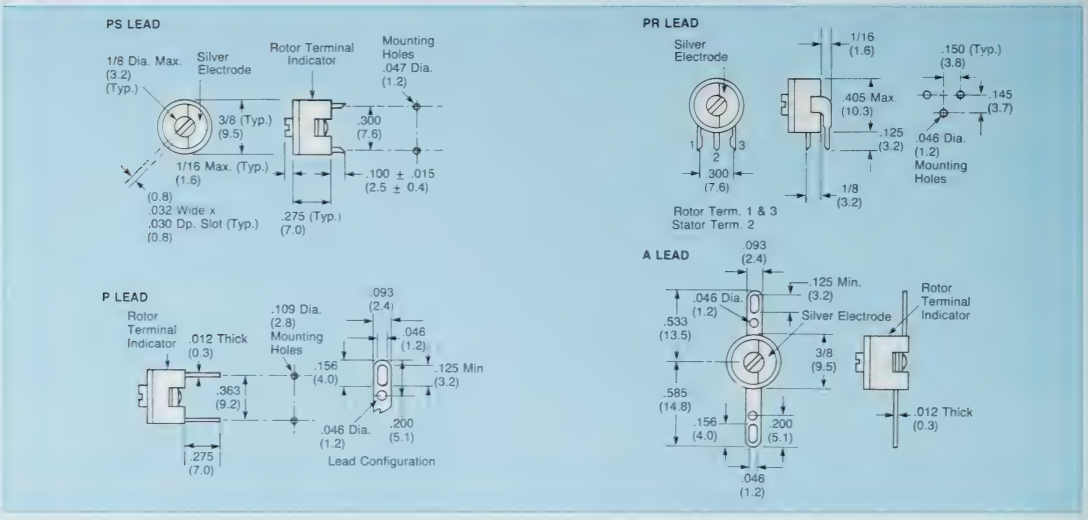
- **Wide selection of capacitance ranges to 60 pF max.**
- **Exceptionally linear TC**
- **Low cost**
- **Excellent resistance to shock and vibration**

SPECIFICATIONS

Operating Temp. Range	−55°C to +125°C
Working Voltages:	350 VDC for −55°C to +85°C 200 VDC for +85°C to +125°C Except N650 and N1500 units; 200 VDC for −55°C to +85°C 100 VDC for +85°C to +125°C
Test Voltages	500 VDC
"Q" Factor	500 min. @ 1 MHz
Insulation Resistance	10^4 megohms min.
Tuning Torque	1 to 6 in.-oz.

Part Number	Capacitance Range (pF)	Temp. Coeff. (ppm/°C)
DV11 ___ 8A	2.0 to 8.0	NPO
DV11 ___ 11B	2.5 to 11.0	N300
DV11 ___ 15D	3.0 to 15.0	N650
DV11 ___ 18A	5.5 to 18.0	NPO
DV11 ___ 25B	7.0 to 25.0	N300
DV11 ___ 35D	9.0 to 35.0	N650
DV11 ___ 60Q	15.0 to 60.0	N1500

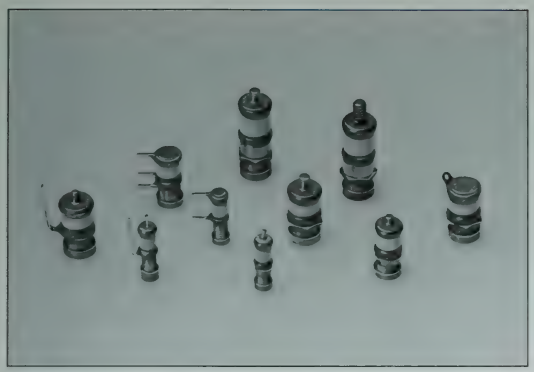
DIMENSIONS: in. (mm)



ORDERING INFORMATION

	DV11	PS	18	A
	Type	Mounting Style	Max. Cap	TC Code

PRECISION MINIATURE AIR VARIABLE CAPACITORS MVM SERIES



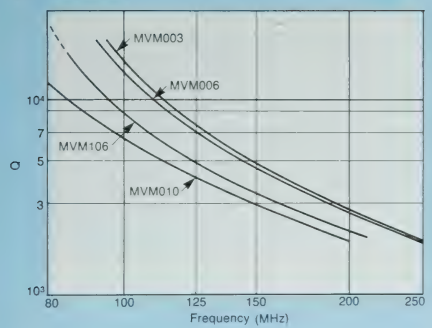
The miniature MVM air variable capacitor was designed for high frequency applications up to 2 GHz and is a very stable device providing good resolution and displaying excellent characteristics when subjected to environmental extremes. It also provides the highest "Q" of any type air dielectric variable capacitor. Today's major applications include VHF, UHF, microwave military communications, navigation, fire control, space and various commercial RF appliances. All air variable capacitors meet or exceed the requirements of MIL-C-14409.

OUTSTANDING CHARACTERISTICS

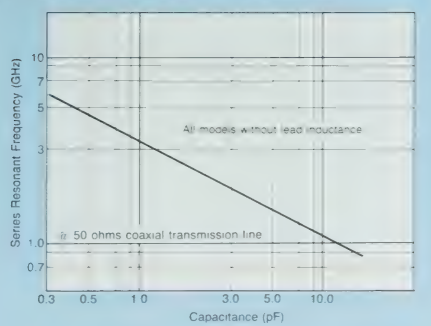
- **A positive stop beyond maximum rated capacitance prevents electrical shorting.**
- **Rugged MVM's are engineered to resist heat—won't come apart during soldering.**
- **Internal air meshing shells are silver plated to provide best surface conductivity and long life.**
- **A high density ceramic insulator of excellent electrical properties is used between stator and mounting bushing. This construction also contributes to the overall structural strength.**
- **Rubber gasketed threaded end cap effectively seals unit against humidity and contamination.**
- **300°C, ±5°C solder melting temperature.**
- **All leads are gold plated for optimum high frequency conductivity and easy soldering.**

PERFORMANCE DATA

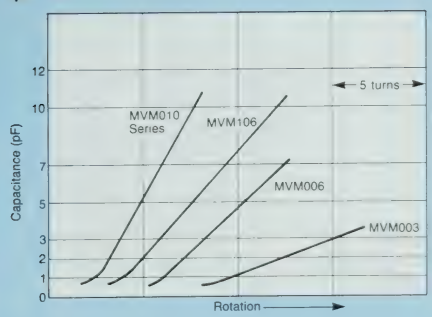
Q Vs. Frequency



Self - Resonant Frequency Vs. Capacitance



Capacitance Vs. Rotation



RECOMMENDED HANDLING PROCEDURE

1. **Soldering** ··· Use a 40 watt soldering iron with a maximum tip temperature of 270°C. Dwell time should not exceed 5 sec.
2. **Washing** ···· End caps must be secure if components are to be immersed in solvent or water. If end caps are not used, clean with a brush or absorbent pad.
3. **Caution** ···· Do not remove rotor from the unit. Do not force rotor to turn when the mechanical maximum capacitance stop is reached.

PRECISION MINATURE AIR VARIABLE CAPACITORS
MVM 010, MVM 014, MVM 020 SERIES

DIMENSIONS: in. (mm)

HORIZONTAL TUNING

FIG. 1

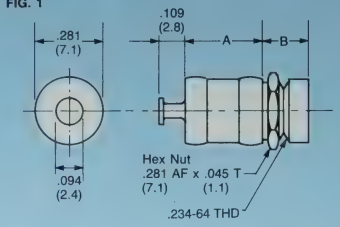


FIG. 2

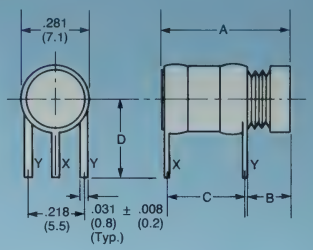


FIG. 3

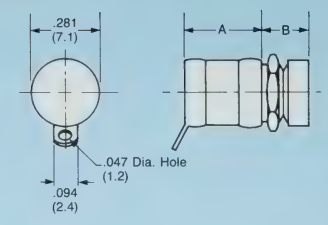
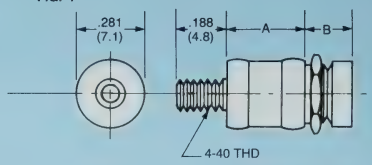


FIG. 4



ELECTRICAL SPECIFICATIONS

Part No.	Military Specification Designation	Capacitance Range (pF)	"Q" Factor @ 100 MHz	Temp. Coeff. ppm/°C	Fig. No.
MVM010	PC31J100	0.8—10.0	>5000	0 ± 15	1
MVM010W	PC26J100	0.8—10.0	>5000	0 ± 15	2
MVM010M	PC25J100	0.8—10.0	>5000	0 ± 15	3
MVM010H	—	0.8—10.0	>5000	0 ± 15	4
MVM014	PC31J140	1.0—14.0	>3000	0 ± 25	1
MVM014W*	—	1.0—14.0	>3000	0 ± 25	2
MVM014M	PC25J140	1.0—14.0	>3000	0 ± 25	3
MVM020	PC31J200	1.0—20.0	>1500	0 ± 25	1
MVM020W*	—	1.0—20.0	>1500	0 ± 25	2
MVM020M	PC25J200	1.0—20.0	>1500	0 ± 25	3

MECHANICAL SPECIFICATIONS

Part No.	Fig. No.	A	B	C	D
MVM010	1	.288(7.3)	.196(5.0)	—	—
MVM010W	2	.535(13.0)	.197(4.4)	.297(7.5)	.312(7.9)
MVM010M	3	.302(7.7)	.196(5.0)	—	—
MVM010H	4	.288(7.3)	.196(5.0)	—	—
MVM014	1	.288(7.3)	.196(5.0)	—	—
MVM014W*	2	.510(13.0)	.172(4.4)	.297(7.5)	.312(7.9)
MVM014M	3	.302(7.7)	.196(5.0)	—	—
MVM020	1	.500(12.7)	.242(6.1)	—	—
MVM020W*	2	.750(19.1)	.150(3.8)	.562(14.3)	.500(12.7)
MVM020M	3	.514(13.0)	.242(6.1)	—	—

All dimensional tolerances ± .016 (0.4) unless otherwise specified.
*No slot in seal cap.

GENERAL SPECIFICATIONS

Working Voltage	250 VDC
Test Voltage	500 VDC
I.R.	$> 10^6$ megohms at 250 VDC
Torque	0.5 to 5.0 in.-oz.
Operating Temp. Range	−65°C to +125°C

PRECISION MINIATURE AIR VARIABLE CAPACITORS
MVM 003, MVM 006, MVM 106 SERIES

DIMENSIONS: in. (mm)

HORIZONTAL TUNING

FIG. 5

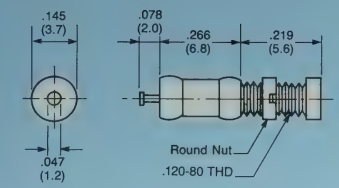


FIG. 6

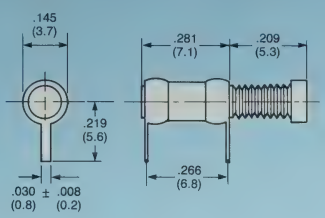


FIG. 7

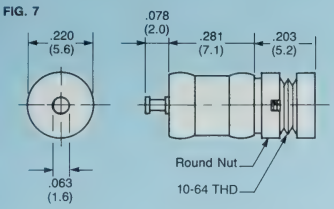
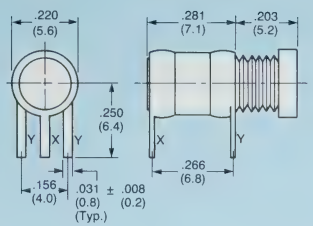


FIG. 8



All dimensional tolerances ± .016 (0.4) unless otherwise specified.

ELECTRICAL SPECIFICATIONS

Part No.	Military Specification Designation	Capacitance Range (pF)	"Q" Factor @ 100 MHz	Temp. Coeff. ppm/°C	Fig. No.
MVM003	PC29J3R5	0.35— 3.5	>10000	0 ± 15	5
MVM003W	PC28J3R5	0.35— 3.5	>10000	0 ± 15	6
MVM006	PC31J060	0.40— 6.0	>10000	0 ± 15	7
MVM006W	—	0.40— 6.0	>10000	0 ± 15	8
MVM006M	PC25J060	0.40— 6.0	>10000	0 ± 15	—
MVM106	PC29J100	0.80—10.0	> 7500	0 ± 15	7
MVM106W	—	0.80—10.0	> 7500	0 ± 15	8

GENERAL SPECIFICATIONS

Working Voltage	250 VDC
Test Voltage	500 VDC
I.R.	$> 10^6$ megohms at 250 VDC
Torque	0.3 to 3.0 in.-oz. for MVM003 Series 0.4 to 4.0 in.-oz. for MVM006 and MVM106 Series
Operating Temp. Range	−65°C to +125°C

PRECISION MINIATURE
AIR VARIABLE CAPACITORS
MVM 003, MVM 010, MVM 014 SERIES

DIMENSIONS: in. (mm)

VERTICAL TUNING

FIG. 9

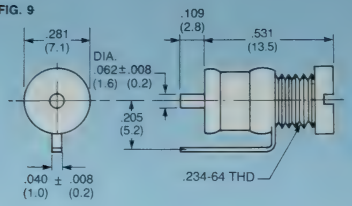


FIG. 10

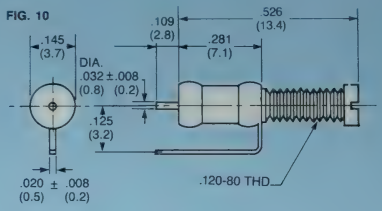


FIG. 11

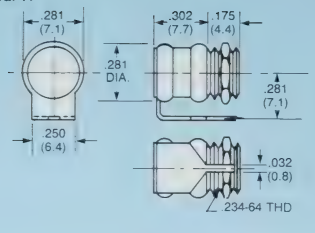
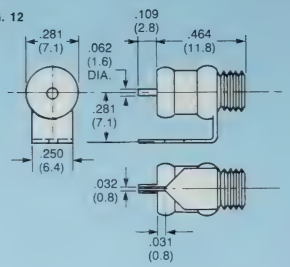


FIG. 12



All dimensional tolerances ± .016 (0.4) unless otherwise specified.

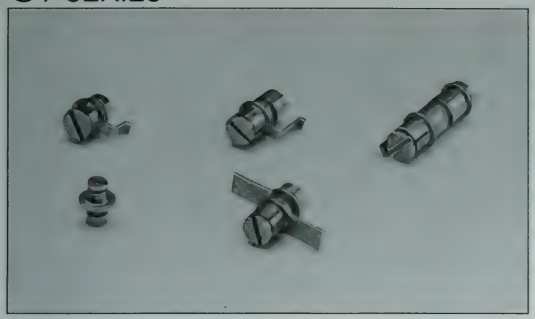
ELECTRICAL SPECIFICATIONS

Part No.	Military Specification Designation	Capacitance Range (pF)	"Q" Factor @ 100 MHz	Temp. Coeff. ppm/°C	Fig. No.
MVM010T	—	1.0—10.0	> 5000	0 ± 15	9
MVM014T	PC32T140	1.5—14.0	> 3000	0 ± 25	9
MVM003T	PC30J3R5	0.5— 3.5	>10000	0 ± 15	10
MVM010S	—	1.0—10.0	> 5000	0 ± 15	11
MVM014S	—	1.5—14.0	> 3000	0 ± 25	11
MVM010B	—	1.0—10.0	> 5000	0 ± 15	12
MVM014B	—	1.5—14.0	> 3000	0 ± 25	12

GENERAL SPECIFICATIONS

Working Voltage	250 VDC
Test Voltage	500 VDC
I.R.	> 10^6 megohms at 250 VDC
Torque	0.5 to 5.0 in.-oz. for MVM010 and MVM014 Series 0.3 to 3.0 in.-oz. for MVM003T
Operating Temp. Range	−65°C to +125°C

HIGH RESOLUTION MICRO MINIATURE SAPPHIRE TRIMMERS FOR MICROWAVE CIRCUITS GT SERIES



Pin Trims are micro miniature capacitors which provide fine tuning for RF hybrid microwave circuits that offer maximum stability of electrical characteristics under any operating condition. Increased reliability, improved performance and space saving size allows new design flexibility where trimming is not usually a plausible option.

FEATURES

- **Easy impedance matching for microwave transistor circuits**
- **High working voltage**
- **High resolution trimming**
- **Long adjustment life**
- **Extremely high "Q" factor**
- **Five mounting styles**
- **Rugged construction**

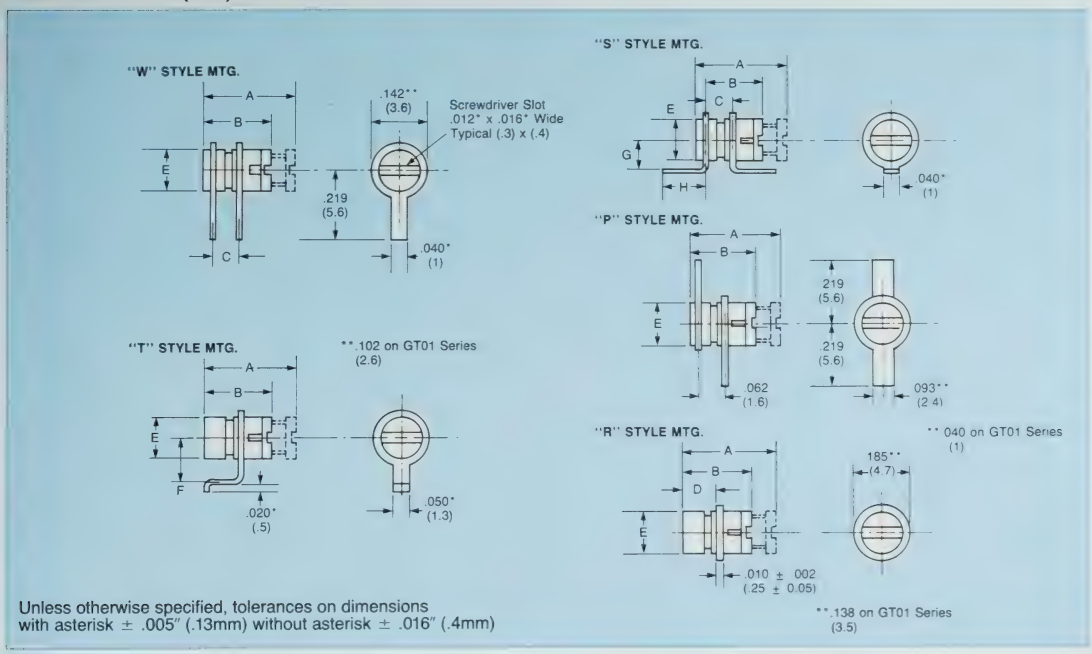
ORDERING INFORMATION

GT	01	W
Type	Size	Style

GENERAL SPECIFICATIONS

Operating Temperature	−65°C to +125°C
Working Voltage	500 VDC
Test Voltage	1000 VDC
Insulation Resistance	10^4 megohms @ 500 VDC
Temperature Coefficient	+350 ± 100 ppm/°C (+200 ± 100 ppm/°C for GT01 series)
Tuning Torque	0.2 to 2.0 in.-oz. (0.1 to 1.0 in.-oz. for GT01 series)

DIMENSIONS: in. (mm)



Unless otherwise specified, tolerances on dimensions with asterisk ± .005" (.13mm) without asterisk ± .016" (.4mm)

ELECTRICAL SPECIFICATIONS

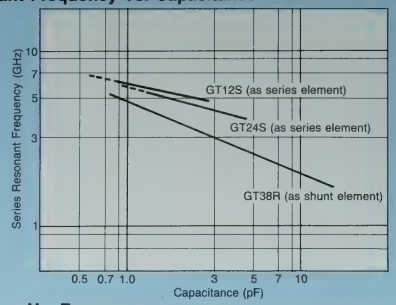
MECHANICAL SPECIFICATIONS

Series	Capacitance Range (pF)	"Q" Factor @ 250 MHz	A	B	C	D	E*	F	G	H
GT 01	0.3—1.2	4000	.215(5.5)	.156(4)	.080(2)	.083(2.1)	.075(1.9)	.071(1.8)	.047(1.2)	.175(4.5)
GT 12	0.4—2.5	3000	.213(5.4)	.169(4.3)	.080(2)	.091(2.3)	.118(3)	.115(2.9)	.071(1.8)	.148(3.8)
GT 24	0.6—4.5	2000	.323(8.2)	.246(6.3)	.126(3.2)	.142(3.6)	.118(3)	.115(2.9)	.071(1.8)	.148(3.8)
GT 38	0.8—8.0	1000	.571(14.5)	.413(10.5)	.250(6.4)	.250(6.4)	.118(3)	.115(2.9)	.071(1.8)	.148(3.8)

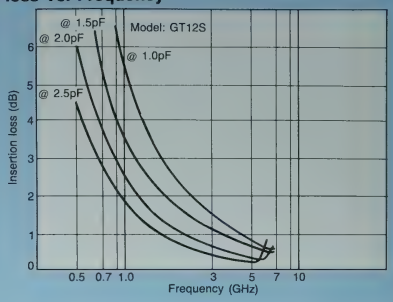
HIGH RESOLUTION
MICRO MINIATURE SAPPHIRE TRIMMERS
FOR MICROWAVE CIRCUITS
GT SERIES

PERFORMANCE DATA

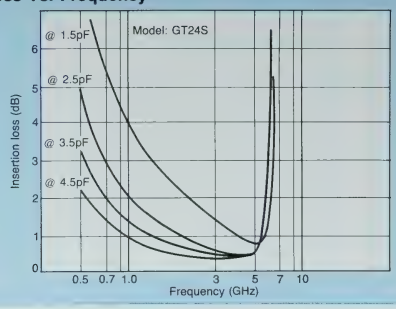
Self-Resonant Frequency Vs. Capacitance



Insertion loss Vs. Frequency



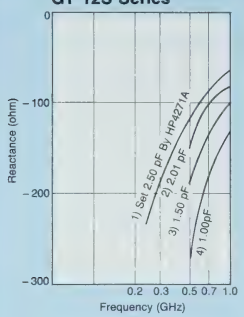
Insertion loss Vs. Frequency



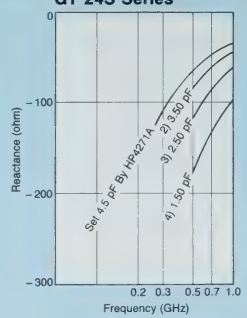
Equivalent Series Resistance vs. Frequency

Measured on HP Network Analyzed System 8410S

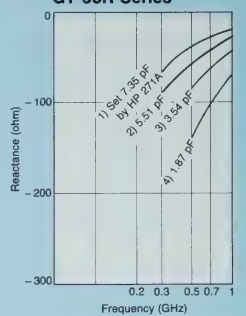
GT 12S Series



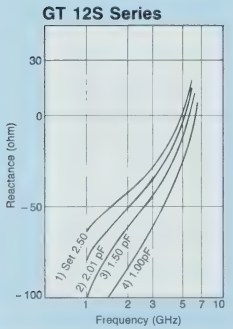
GT 24S Series



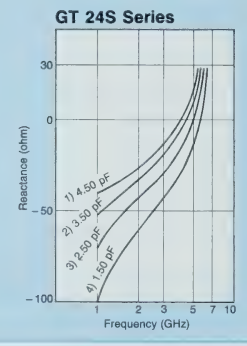
GT 38R Series



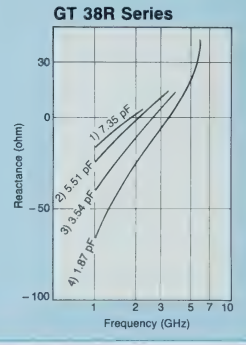
GT 12S Series



GT 24S Series



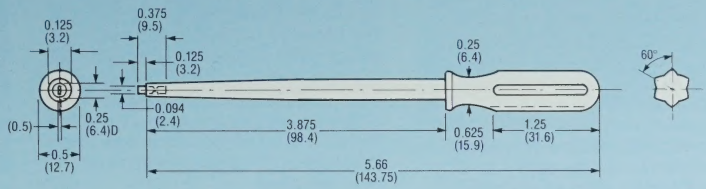
GT 38R Series



TUNING TOOLS & DESIGN ENGINEERING KIT

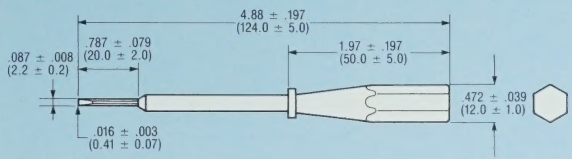
Part Number
ME501

A general purpose tuning tool for all Murata Erie trimming capacitors. Tuning element is metal.



Part Number
ME502

A high accuracy tuning tool featuring a completely passive, long life *ceramic* tuning element that has *no* incidental effect on the device under adjustment.



DESIGN ENGINEERING KITS

Murata Erie Design Engineering Kits provide the engineer with a representative sampling of surface mounted trimming capacitors for prototyping applications. Four individual kits are offered:

Kit Part Number	Contents
TZSBOX-1	TZ03XXXXFR169 and TZB04XXXXBC
TZSBOX-2	TZB04XXXXBA/BB/BE and TZC03XXXXA110
TZSBOX-3	TZB04XXXXBA/BB/BC/BD/BE
TZSBOX-4	TZ03XXXXFR169, TZB04XXXXBA and TZC03XXXXA

For complete information on these Design Engineering Kits, call your local Murata Erie Sales Representative or Distributor.

GENERAL TEST PROCEDURES

CAPACITANCE:
When measured at room temperature (25 ± 5°C) and a frequency of 0.1 to 1 MHz, the minimum capacitance shall not be greater than the specified min. and the maximum capacitance shall not be less than the specified max.

"Q" FACTOR:
When measured at room temperature using a Boonton Electronic's Type 75A bridge or equivalent at 1 MHz, the trimmer capacitor shall have a "Q" value not less than specified when the trimmer is set at 75% of rated max. capacity (Note: Air dielectric trimmers are usually measured at 100 MHz using a Boonton Radio type 190; Sapphire dielectric trimmers are read at 250 MHz also using the BR 190 or a coaxial line system)

INSULATION RESISTANCE:
Measured at room temperature through a one megohm source resistance, at approximate max. cap. setting shall equal or exceed rated value (Note: Failures measured over 50% Relative Humidity are not counted).

DIELECTRIC STRENGTH:
The capacitor, set at approximate max. capacity shall withstand rated Withstanding Volts for 5 seconds.

TORQUE:
Room temperature torque required to start and maintain rotation shall be within specified range.

TEMPERATURE COEFFICIENT:
The TC shall be measured with the capacitor set at approximately 75% rated max. capacity, then remeasured at −55, −10, +25, +85, and/or +125, and finally, at +25°C as required. The Temperature Coefficient shall remain within specified limits.

$$TC = \frac{(Cx - Co)}{Co} X \frac{(10^6)}{(Tx - To)} \quad /°C$$

CAPACITANCE DRIFT:
Drift is the greatest change between any two readings at 25°C after the normal excursions taken for TC measurements.

ACCELERATED LIFE TEST:
The capacitor shall be set for approximately 75% of rated max. capacity and tested for specified time at twice rated working volts. After return to stabilized room temperature, the capacitor shall remain within specified Q, Insulation Resistance and other limits specified.

TEMPERATURE CYCLING:
The capacitor shall be set for 75% of rated max. capacity and then be subjected to five each of the following cycles.

1. −55°C (30 minutes)
2. +25°C (15 minutes)
3. +85 (or +125) °C (30 minutes)
4. +25°C (15 minutes)

The rate of cooling or heating shall not be less than 3°C per minute. The temperature cycles shall be followed by 96 hour exposure to 95% RH at specified temperature. The capacitor shall then be removed and held at 25°C and 50% max. RH Q, Insulation Resistance, and capacity change shall remain within specified limits.

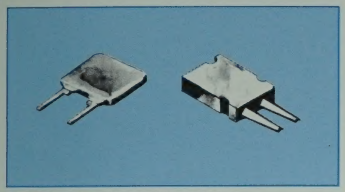
RELATIVE HUMIDITY:
Capacitors shall be set for 75% of rated max. capacity and subjected to specified time of 96% Relative Humidity (RH) at specified atmospheric temperature. (Note: standard time is 96 hours and standard temperature is +40°C) The capacitor shall then be removed from the humidity chamber and held at +25°C for the specified time with a maximum humidity of 50%. After the test sequence, the capacitor shall be tested for Q, I.R. & capacity change which are all required to remain within specified limits.

TUNING LINEARITY:
Test capacitors are rigidly mounted in the normal manner and turned through a standard number of degrees with capacity measured after each turning procedure. Plotted points shall not deviate from an average straight line by more than the allowable percentage. (i.e., theoretical line point capacity x 100)

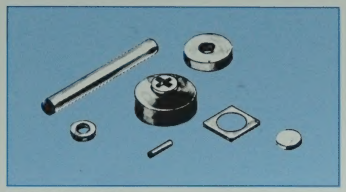
NOTES:
Special Measurements and testing.

1) Support data and test methods are available on request. Please contact the appropriate product engineering group.
2) Special tests and test methods can be arranged by contacting your local sales office or the appropriate product manager.

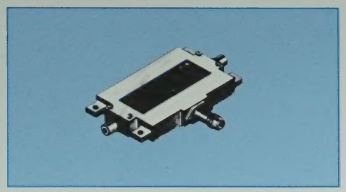
OTHER MURATA ERIE PRODUCTS



CERAMIC RESONATORS...
for low cost microprocessor applications in low KHz to medium MHz frequency ranges.



RESOMICS®...
ceramic microwave dielectric resonators for filters, oscillators, and waveguides to 50GHz with Q's over 10,000.



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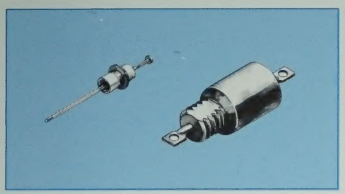
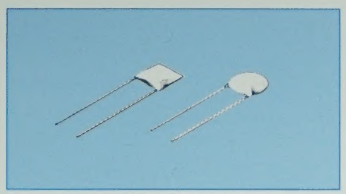
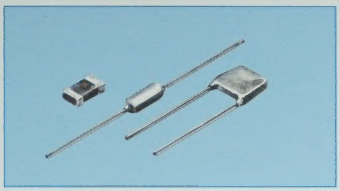
microwave filters offering exceptional temperature stability for mobile communication and other systems applications.



EMI/RFI FILTERS...
L, T, Pi and C types to 30 GHz in a variety of configurations including filter connectors. Many to MIL specifications.



DISC CERAMIC CAPACITORS...
in a large variety of sizes, voltages and T.C.'s



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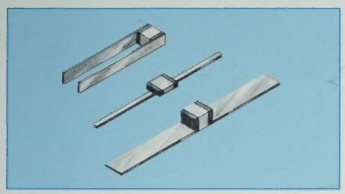

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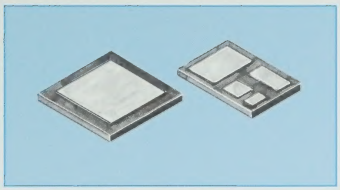

CLA PARALLEL PLATE...
trimmable single layer ceramic capacitors for MIC applications.

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